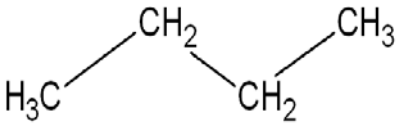
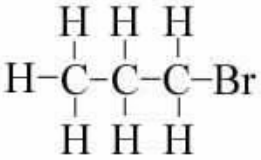
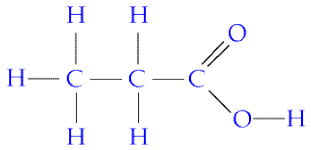
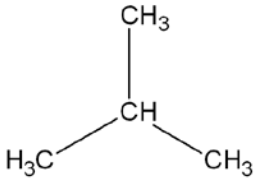
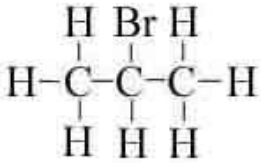
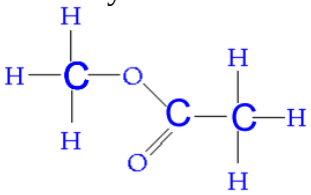
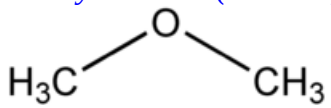
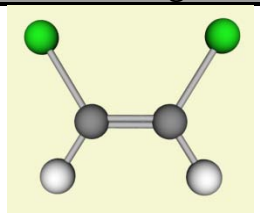
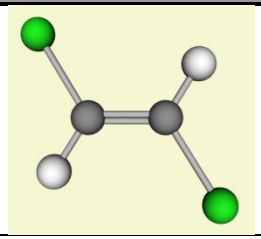
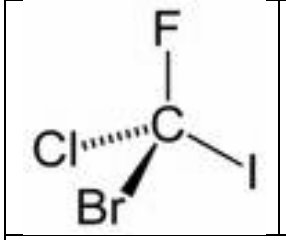
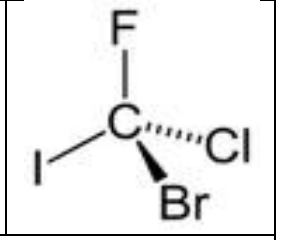
Isomers

Isomers are molecules that have the same molecular formula but different structural formula

1) Constitutional

chain isomerism	positional isomerism	functional group isomerism
butane 	1-bromopropane 	propanoic acid 
2 methyl propane 	2-bromopropane 	methyl ethanoate 
pentane C_5H_{12} has 3 isomers *make, draw & name them*	*make & draw butan-1-ol and butan-2-ol*	*C_2H_6O has 2 isomers* *methoxy methane (an ether)*  *and*

2) Stereoisomers

geometric cis or trans isomers		Enantiomers	
			
cis-1,2-dichloroethene	trans-1,2-dichloroethene	CBrClFI	

• restricted rotation about a C=C • 2 different groups on the left hand side and 2 different groups on the right hand side	• are mirror images of each other • have the same structural formula •known as optical isomers because of their effect on plane polarised light • have 4 different groups positioned around a chiral carbon atom
make & draw cis-but-2-ene *and* *trans-but-2-ene*	*make & draw 2 3d sketches of butan-2-ol* *so that they are mirror images of each other*
additional information **mp (‘C) / bp (‘C)** **cis** -80 / 60 **trans** -50 / 48 *why is the bp of cis higher?* cis is polar trans is non-polar with permanent dipole forces as well as temporary dipole forces so more energy is required to boil the cis isomer so bp is higher *why is the melting point of cis lower?* in a solid state the molecules must pack together efficiently, however the U shape of the cis isomer will not pack as well as the straight shape of the trans isomer so less energy is needed to melt the cis isomer so the mp is lower	**additional information** A solution of one enantiomer rotates the plane of polarisation in a clockwise direction. This enantiomer is known as the (+) form or given the letter L for **levorotatory** A solution of the other enantiomer rotates the plane of polarisation in an anti-clockwise direction. This enantiomer is known as the (-) form or given the letter D for **dextrorotatory** When optically active substances are made in the lab, they often occur as a 50/50 mixture of the two enantiomers. This is known as a **racemic** mixture or racemic. It has no effect on plane polarised light.